Savelsberg process, pot roasting, briquetting fine sulphides, the Dwight and Lloyd sintering process, flotation processes, and the Macquisten process. While these metallurgical inventions deal with base metals, it must not be forgotten that the ores treated almost always contain appreciable quantities of gold and silver, which they will concentrate and save.

A NEAT method of showing the hydrolysis of salts as a chemical lecture experiment is described by Mr. B. L. Vanzetti in the *Gazzetta* (vol. xxxviii., ii., p. 98). An ordinary test-tube is three parts filled with a solution of gelatin coloured with litmus or with phenolphthalein rendered pink by a trace of alkali. A solution of an easily hydrolysed salt, such as ferric chloride, is poured on to the surface of the gelatin after the latter has set. In a short time two zones become visible in the gelatin, one of which, the lower, travelling more quickly through the gelatin, is due to acid, which renders the phenolphthalein colourless; the second zone, at the surface of the gelatin, is coloured by the hydroxide of the base. In the case of ferric chloride this zone is dark brown and opaque, owing to ferric hydroxide being formed. Coloured salts, such as copper sulphate on cobalt nitrate, can also be conveniently used.

FROM the Cambridge University Press Warehouse, Fetter Lane, we have received copies of three forms designed to facilitate the astronomical computations of time, azimuth, and latitude. These forms have been arranged by Messrs. A. R. Hinks and H. K. Shaw, of Trinity College, for use in the Cambridge Geography School, and are somewhat similar to, but more elaborate than, those used for some years past by the students at the Royal College of Science, South Kensington. The first form is for computing time or azimuth from observations of the sun's altitude, and the second for the analogous computation from the altitude of a star, whilst the third is set out for the computation of latitude from circum-meridian observations of sun or star. Such forms are invaluable, especially to those observers who, knowing the general methods, are yet a little hazy as to the details of the computations, for unless one is making and reducing the observations regularly it often occurs that the simplest method of computing is but imperfectly remembered; hence follows loss of time and unnecessary increase of labour; but on these forms every correction, every step in the computation is clearly set out, and it becomes impossible for the observer to forget a correction or to apply a wrong function. In addition to this, each form contains a few useful hints and a diagram to be filled in showing exactly the angles measured. Whilst the forms appear to be otherwise complete, we think it would enhance their value were the entire formula employed inserted, because this would often give the occasional observer a valuable reminder as to the exact form of computation he was employing. The forms are sold in strong envelopes, and the price of each envelope, containing twelve copies of one form, is one shilling net.

MR. THOMAS THORP, of Guildford, has issued a catalogue of the books on botany and gardening, zoology, geology, mathematics and physics, offered by him for sale.

A SUBJECT list of works of reference, biography, bibliography, the auxiliary historical sciences, &c., in the library of the Patent Office has just been published at the Patent Office, 25 Southampton Buildings, W.C.

THE second part of the second French edition of Mr. W. Rouse Ball's "Récréations mathématiques et Problemes des Temps anciens et modernes" has just been published by M. A. Hermann, Paris. The translation follows the fourth English edition, and Mr. J. Fitz-Patrick has added to it some new subjects of interest, among them being parquetry or tiling, the game of dominoes, and constructions for the squaring of the circle.

OUR ASTRONOMICAL COLUMN.

COMET MOREHOUSE, 1908*c*.—Several observations of comet 1908*c* are recorded in No. 4274 of the *Astronomische Nachrichten* (p. 29, September 23). M. Chofardet, observing at Besançon on September 5, describes it as having a round, nebulous head, of ninth magnitude and 2′·5 diameter, without any definite nucleus. A short, indistinct tail was seen projecting from the head in a N.W. direction. On September 6, 7, and 8, Prof. Abetti, at Arcetri, found the comet to have an oblong nebulous appearance without nucleus, its diameter being 2 and its magnitude 9·0.

Herr Ebell continues the ephemeris published by Prof. Kobold in a previous number, and the following is an abstract therefrom:—

Ephemeris 12h. M.T. Berlin.

1908	α (true) h. m.	δ (true) ° ′	log *r*	log Δ	Brightness
Oct. 8	19 57·9	+61 21·4	0·2010	0·0154	4·8
,, 10	19 45·9	+57 59·9	0·1942	0·0100	5·0
,, 12	19 36·1	+54 30·3	0·1872	0·0062	5·3
,, 14	19 28·1	+50 55·3	0·1801	0·0043	5·5
,, 16	19 21·4	+47 17·7	0·1730	0·0041	5·7
,, 18	19 15·9	+43 40·0	0·1657	0·0058	5·9
,, 20	19 11·3	+40 4·2	0·1584	0·0090	6·0
,, 22	19 7·5	+36 32·6	0·1510	0·0139	6·1
,, 24	19 4·3	+33 6·7	0·1436	0·0201	6·0

The apparent positions of the comet among the stars, according to the above ephemeris, are shown approximately

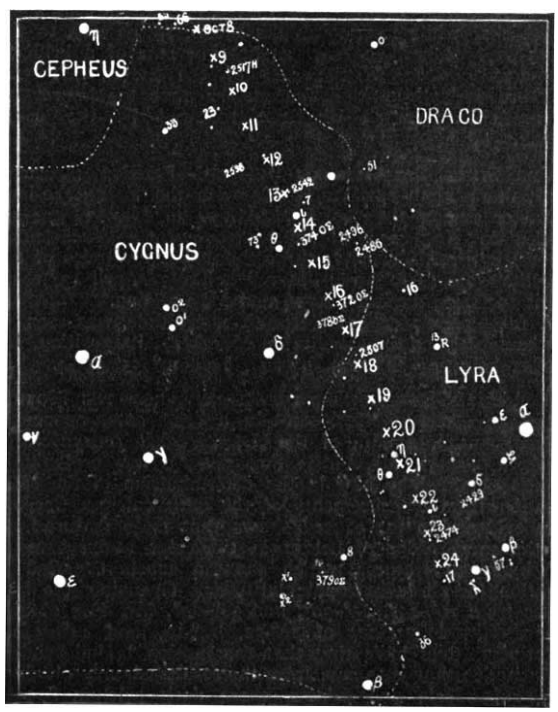

Chart showing apparent path of Morehouse's Comet, October 8–24.

on the accompanying chart; it will be noted that the comet passes quite close to the fourth-magnitude star 1 Cygni on October 14. According to an observation made

at Copenhagen on September 20, the corrections to be applied to the ephemeris position were +1m. 18s. and −1′·3. Prof. H. Thiele also states that the comet was visible to the naked eye, and that the tail was 1°·5 long with a bend amounting to 13°, at 12′ from the head.

As pointed out in a letter received from Prof. Dale, the positions given by the Lick ephemeris gradually became worse until, on October 3, the error amounted to about 3°. Elements computed by Prof. Dale differ but little from those computed by Prof. Kobold, whilst an ephemeris with which he has favoured us gives the following positions for October 8 and 14 respectively:—R.A. 20h. 2·8m., dec. +61° 52′·4; R.A. 19h. 31·5m., dec. +51° 40′·8. For the Kiel ephemeris Prof. Dale's observations on October 3 indicated an error of −3·4m. and −18′, whilst later observations indicate that the departure from the ephemeris positions is steadily increasing.

COMET TEMPEL$_3$-SWIFT.—The comet Tempel$_3$-Swift, for which we gave a search-ephemeris in these columns last week, was re-discovered by M. Javelle at the Nice Observatory on September 29. The following was its position at 15h. 9·4m. (Nice M.T.) on that date:—

R.A. = 6h. 44m. 14·6s., dec. = +32° 37′ 55″.

Of the three ephemeris positions given for September 29, this agrees best with that calculated for the mean date (September 30·88) of the perihelion passage. When re-discovered, the magnitude of the comet was 14·0, and its distances from both earth and sun are increasing. Its present position is in the constellation Gemini, and it is apparently travelling, according to the ephemeris, towards Castor and Pollux.

BRIGHT BOLIDES.—A meteor, considerably brighter than Vega, was observed by Mr. W. Moss at Wimbledon Park, at 7h. 4m. p.m., on October 1. Its approximate path wa from 213°, +76½°, to 183½°, +78½°, its colour bluish-white, and its velocity medium. At its disappearance the meteor exploded, leaving a short trail. Mrs. E. Gifford, writing from Oaklands, Chard, says that at about 5.45 p.m. on October 1, while looking at the moon, which was to the south-west of her, she saw a shooting star of a brilliant blue-green colour to the east of the moon. It was still broad daylight, and the meteor gave the impression of an oblong patch of light followed by the usual streak.

THE SIXTH SATELLITE OF JUPITER.—Position measures of Jupiter's sixth satellite, made with the Yerkes 40-inch refractor during the period March 24 to May 3, are recorded in No. 4274 of the *Astronomische Nachrichten* (p. 17) by Prof. Barnard; the estimated magnitudes of the satellite were as follows:—March 24, 14·5; April 13, 14·0; April 19, 14·2; April 21, 14·5; and May 3, 14·0.

A faint nebula of the sixteenth magnitude was seen in the same field as the satellite on March 24, its position, for 1908·0, being $\alpha = 8h.\ 26m.\ 56{\cdot}58s.$, $\delta = +19°\ 55'\ 55''{\cdot}4$.

THE SOLAR ROTATION AS DETERMINED FROM THE MOTION OF DARK CALCIUM FLOCCULI.—In a brief note, appearing in No. 2, vol. xxviii., of the *Astrophysical Journal* (September, p. 117), Mr. Philip Fox gives a few preliminary results obtained by him in the determination of the solar rotation from measurements of the dark calcium flocculi. The evidence so far educed shows that these features are of the same order of height in the solar atmosphere as the hydrogen features, which show a constant period of rotation for all heliographic latitudes. Grouping the latitudes from 20°–25°, 25°–30°, and 30°–35°, Mr. Fox obtains mean diurnal motions of 14°·32, 14°·10, and 14°·14 respectively, thus indicating that the motion is independent of latitude; that is to say, from the results already obtained by Profs. Hale and Adams, these dark calcium flocculi belong to the higher levels of the solar atmosphere. Mr. Fox also confirms the previous observations that the dark flocculi are prominences seen in projection on the disc, but finds that they are not so easily seen as the corresponding dark hydrogen flocculi.

IRON AND STEEL INSTITUTE.

THE autumn meeting of the Iron and Steel Institute was held at Middlesbrough on September 28 to October 2 under the presidency of Sir Hugh Bell, and was largely attended. The institute was welcomed in an eloquent speech by the Mayor of Middlesbrough, and the president, after acknowledging the welcome, announced that Sir William T. Lewis, Bart., K.C.V.O., had been chosen to succeed him in the presidential chair in May, 1909. Sixteen papers were on the programme, and three mornings were devoted to their reading and discussion.

The first paper read was by Mr. J. E. Stead, F.R.S., who exhibited and described a simple form of inexpensive microscope suitable for the use of foundry foremen and of assistants in steel works.

The next paper read was that by Mr. W. Hawdon (Middlesbrough), on the iron and steel industries of the Cleveland district. He gave a brief review of the iron and steel industries of the Cleveland district during the last quarter-century, *i.e.* since 1883, on the occasion of the last visit of the institute to Middlesbrough, to the present time. The record showed that the iron and steel trade of the district had considerably increased and its position consolidated. The population of Middlesbrough had doubled, but the output of Cleveland ironstone remained about as it had been. In 1899 the first basic open-hearth steel was produced in the district, 10,154 tons being made in that year. The output has rapidly increased, and the question arises, if this increase of basic open-hearth steel continues, where is the ironstone to come from? The best ironstone is rapidly going; there is, however, a large area of stone, of a gradually diminishing richness, or rather of increasing poverty, available for many years to come. If, then, at the end of another quarter of a century the Iron and Steel Institute again visits the district, it may see, should the steel age still be vigorous, a greater output of basic steel and a larger production of pig-iron from native ironstone, which will be won, if not by manual labour, then by one of the many devices which are and will be available for the purpose.

Mr. T. C. Hutchinson (Saltburn) read a paper on the mechanical cleaning of iron ores, in which he considered the most economical method of treating any description of ore by careful selection, and the removal by mechanical means of as much of the impurities as can be easily distinguished by their appearance. He gave his experience in dealing with and smelting Cleveland ironstone when worked for a period of years from the same mine, and tabulated the yield of iron from the ore, and the consumption of fuel and flux required under various conditions due to the irregularity of impurities admixed with ore as delivered from the mines. Many years of careful observation have led him to the conclusion that, whether these impurities are charged into the furnace in larger or smaller percentages as compared with the main bed of ironstone, the coke and limestone requirements and the cost of smelting increase in exact ratio. It is cheaper to pick out impurities mechanically than to melt them out in the blast-furnace. Mechanical cleaning is desirable, and can be applied to all descriptions of ores used in the manufacture of pig iron.

The paper read by Mr. Greville Jones (Middlesbrough), on Messrs. Bell Brothers' blast furnaces, was of great historical interest and educational value. He gave full particulars and dimensioned drawings of the furnaces built by the firm from 1844 to 1908.

A paper by Prof. H. Bauerman (London), on metallurgy at the Franco-British Exhibition, was read by title only, as the author, being a member of the jury, considered that the paper should not be published until the official list of awards had been announced. In connection with this paper, a compilation of analyses of British pig-irons shown at the Exhibition was presented by Mr. Bennett H. Brough. In view of the paucity of published analyses, it forms a very useful work of reference, as the exhibits shown in the Collective Pig-Iron Stand have been carefully selected as typical for the various districts represented.

The paper read by Mr. C. H. Merz (London), on the